

WHAT IS CLAIMED IS:

1. A photosensitive composition comprising:

- 5 (a) 30-70% by weight of an epoxide-containing material;
- (b) 5-35% by weight of an acrylic material selected from aromatic acrylic material, cycloaliphatic acrylic material, or combinations thereof;
- 10 (c) 0-40% by weight of a hydroxyl-containing material;
- (d) at least one cationic photoinitiator; and
- (e) at least one free-radical photoinitiator,

wherein said composition, after exposure to actinic
5 radiation, has:

- (i) an elongation at yield in the range of 7% to no yield;
- (ii) a tensile modulus in the range of 1000 to 1600 N/mm²;
- 10 (iii) an average elongation at break of at least 10%; or
- (iv) a yield stress of 28 to 40 kN/mm².

2. The composition of claim 1, wherein the epoxide-
25 containing material is selected from bis(2,3-epoxycyclopentyl)ether, 2,3-epoxy cyclopentyl glycidyl ether, 1,2-bis(2,3-epoxycyclopentyl)oxyethane, bis(4-hydroxycyclohexyl)methane diglycidyl ether, 2,2-bis(4-hydroxycyclohexyl)propane diglycidyl ether, diglycidyl ether
30 of neopentyl glycol, 3,4-epoxycyclohexylmethyl-3,4-epoxycyclohexane, 3,4-epoxy-6-methylcyclohexylmethyl-3,4-epoxy-6-methylcyclohexanecarboxylate, di(3,4-

epoxycyclohexylmethyl)hexanedioate, di(3,4-epoxy-6-methylcyclohexylmethyl)hexanedioate, ethylenebis(3,4-epoxycyclohexanecarboxylate), ethanedioldi(3,4-epoxycyclohexylmethyl)ether, vinylcyclohexene dioxide,
5 dicyclopentadiene diepoxide, 1,2-epoxytetradecane, a di(oxiranyl) poly(oxy-1,4-butanediyl), a partially acrylated bisphenol A epoxy, and 2-(3,4-epoxycyclohexyl-5,5-spiro-3,4-epoxy)cyclohexane-1,3-dioxane, and combinations thereof.

10 3. The composition of claim 1, wherein the acrylic material is selected from 1,4-dihydroxymethyl-cyclohexane diacrylate, bisphenol A diacrylate, trimethylolpropane triacrylate, and ethoxylated bisphenol A diacrylate and combinations thereof.

15 4. The composition of claim 1, wherein the hydroxyl-containing material is selected from 1,4-cyclohexanedimethanol, aliphatic and cycloaliphatic mono hydroxy alkanols, an aliphatic polycarbonate diol, and linear
20 and branched polytetrahydrofuran polyether polyols, and combinations thereof.

5 5. The composition of claim 1, wherein the free-radical photoinitiator is a 1-hydroxyphenyl ketone.

25 6. The composition of claim 1, wherein the free-radical photoinitiator is selected from an alpha-hydroxyphenyl ketone, benzil dimethyl ketal or 2,4,6-trimethylbenzoyldiphenylphosphine oxide.

30 7. The composition of claim 1, wherein the composition comprises 32-48% by weight of an epoxide-containing material.

8. The composition of claim 1, wherein the composition comprises 10-20% by weight of an acrylic material selected from aromatic acrylic material, cycloaliphatic acrylic material, or combinations thereof.

9. The composition of claim 1, wherein the composition comprises 10-39% by weight of a hydroxyl-containing material.

10 10. The composition of claim 1, wherein the composition comprises 35-69.9% by weight of an epoxide-containing material, 10-20% by weight of an acrylic material selected from aromatic acrylic material, cycloaliphatic acrylic material, or combinations thereof, and 10-39% by weight of a hydroxyl-containing material.

11. The composition of claim 10, wherein the epoxide-containing material includes 3,4-epoxycyclohexylmethyl-3,4-epoxycyclohexane carboxylate, 1,2-epoxytetradecane, diglycidyl ether of neopentyl glycol, or α -(oxiranylmethyl)- ω -(oxiranylmethoxy) poly(oxy-1,4-butanediyl), or combinations thereof.

12. The composition of claim 1, wherein the hydroxyl-containing material includes a polytetrahydrofuran polyol, 1,4-cyclohexanedimethanol, or an aliphatic polycarbonate diol, or combinations thereof.

13. A three-dimensional article formed from a photosensitive composition comprising:

- (a) 30-70% by weight of an epoxide-containing material;

- (b) 5-35% by weight of an acrylic material selected from aromatic acrylic material, cycloaliphatic acrylic material, or combinations thereof;
- (c) 0-40% by weight of a hydroxyl-containing material;
- (d) at least one cationic photoinitiator; and
- (e) at least one free-radical photoinitiator,

wherein the article has:

- (i) an elongation at yield in the range of 7% to no yield;
- (ii) a tensile modulus in the range of 1000 to 1600 N/mm²;
- (iii) an average elongation at break of at least 10%; or
- (iv) a yield stress of 28 to 40 kN/mm².

14. The article of claim 13, wherein the composition comprises 35-69.9% by weight of an epoxide-containing material, 10-20% by weight of an acrylic material selected from aromatic acrylic material, cycloaliphatic acrylic material, or combinations thereof, and 10-39% by weight of a hydroxyl-containing material.

15. The article of claim 13, wherein the epoxide-containing material includes 3,4-epoxycyclohexylmethyl-3,4-epoxycyclohexane carboxylate, 1,2-epoxytetradecane, diglycidyl ether of neopentyl glycol, or α -(oxiranylmethyl)- ω -(oxiranylmethoxy) poly(oxy-1,4-butanediyl), or combinations thereof.

16. The article of claim 13, wherein the hydroxyl-containing material includes a polytetrahydrofuran polyol, 1,4-cyclohexanedimethanol, or an aliphatic polycarbonate diol, or combinations thereof.

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17. A process for forming a three-dimensional article comprising:

- (1) coating a layer of a composition onto a surface, the composition comprising:
 - (a) 30-70% by weight of an epoxide-containing material;
 - (b) 5-35% by weight of an acrylic material selected from aromatic acrylic material, cycloaliphatic acrylic material, or combinations thereof;
 - (c) 0-40% by weight of a hydroxyl-containing material;
 - (d) at least one cationic photoinitiator; and
 - (e) at least one free-radical photoinitiator,
- (2) exposing the layer imagewise to actinic radiation to form an imaged cross-section, wherein the radiation is of sufficient intensity to cause substantial curing of the layer in the exposed areas;
- (3) coating a layer of the composition onto the previously exposed imaged cross-section;
- (4) exposing said thin layer from step (3) imagewise to actinic radiation to form an additional imaged cross-section, wherein the radiation is of sufficient intensity to cause substantial curing of the thin layer in the

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exposed areas and to cause adhesion to the
previously exposed imaged cross-section;
(5) repeating steps (3) and (4) a sufficient number
of times in order to build up the three-
dimensional article,

wherein the article has:

- (i) an elongation at yield in the range of 7%
to no yield;
- (ii) a tensile modulus in the range of 1000 to
1600 N/mm²;
- (iii) an average elongation at break of at least
10%; or
- (iv) a yield stress of 28 to 40 kN/mm².

18. The process of claim 17, wherein the actinic
radiation is in the range of 280-650 nm.

19. The process of claim 17 wherein the exposure energy
is in the range of 10-150 mJ/cm.

20. The process of claim 17, wherein the epoxide-
containing material includes 3,4-epoxycyclohexylmethyl-3,4-
epoxycyclohexane carboxylate, 1,2-epoxytetradecane, diglycidyl
ether of neopentyl glycol, or α -(oxiranylmethyl)- ω -
(oxiranylmethoxy) poly(oxy-1,4-butanediyl), or combinations
thereof and the hydroxyl-containing material includes a
polytetrahydrofuran polyol, 1,4-cyclohexanedimethanol, or an
aliphatic polycarbonate diol, or combinations thereof.